



Natural Resources Conservation Service
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May 30, 2003

OKLAHOMA BULLETIN NO. OK210-3-3

SUBJECT: ENG – Changes in Embankment Structure Design Procedures

Purpose: Provide interim procedures for embankment structures.

Expiration Date: September 30, 2003

Based upon several requests from Zone Technical Committees, changes are being made that will affect top widths and quantity calculations for embankment structures (ponds, GSS's, etc.). Effective immediately, the following changes are being instituted:

1. Top widths will be based upon the inventory height of the structure instead of fill height at the centerline of dam. This change will increase the required top width for structures built directly on an overfall.
2. Quantity calculations will be made according to the attached instructions. Currently, quantities are being calculated in different manners across the state. Using a common set of procedures for earth fill and excavation quantities will standardize calculations.
3. Trash guard requirements will be determined by the designer, based upon site and contributing drainage area conditions.
4. Vegetation of embankments will include, at a minimum, all disturbed areas down to an elevation at least two feet below designed permanent pool elevation.
5. Additional pipe length is needed to correct situations for which the computed pipe length is not long enough to extend beyond the upstream shrinkage slope on embankment type structures. The length of principal spillway pipe, as computed by OK-ENGR, will have the following lengths added to the computed pipe length:

Centerline Fill Height (ft.)	Added Pipe Length (ft.)
< 8.0	1.0
8.1 – 12.0	2.0
12.1 – 15.0	3.0
15.1 – 18.0	4.0
18.1 – 22.0	5.0
22.1 – 25.0	6.0
25.1 – 28.0	7.0
28.1 – 32.0	8.0

This table applies to structures that are engineering job class I, II, or III. The added pipe length is to be included from the centerline of the dam to the pipe inlet.

DIST: AE

(MORE)

For class IV and above, the following formula will be used to calculate added pipe length:

Add. Pipe Length = $0.293(\text{Centerline Fill Height}) - 0.27(\text{Top of Dam Elev.} - \text{Principal Spillway Invert Elev.})$

The Pond standard and OK-ENGR are scheduled to be revised this fiscal year. These changes will be incorporated upon revision.

If there are questions concerning these items, please contact your Resource Engineer.

/s/ John Glover, acting for

M. DARREL DOMINICK
State Conservationist

Attachment

How to Compute Earth fill and/or Excavation Quantities

The following procedures for computing earth fill and excavation quantities applies to ponds, grade stabilization structures, structure for water control, tailwater pits, waste treatment lagoons, waste storage facilities, and water & sediment control basins.

The earth fill and/or excavation extent will be the sum of the fill and excavation components as defined below:

Fill

The volume of material required for construction of the embankment and auxiliary spillway outside dike to the designed settled elevation and dimensions.

1. The volume is to be calculated from natural ground before foundation stripping.
2. If there are vertical banks to be sloped or a principal spillway foundation needs to be excavated, then the fill amount will be calculated as if these items have already been completed.
3. The volume required to backfill the core trench is only included when excavated material cannot be placed in the embankment as it is being excavated. (This means the material is either stockpiled for later use or is not suitable for fill and must be wasted.)
4. The auxiliary spillway inside dike is subsidiary to the embankment construction and is not included as part of the fill calculations.

Excavation

The volume of material required for excavation to designed neat lines and grades.

1. The volume of material required to be excavated to construct the designed centerline dam core trench below natural ground, before foundation stripping (after vertical banks are sloped.)
2. Volume of material required to excavate the pipe foundation to design grades including designed exit channel.
3. Any excavation required to construct an auxiliary spillway is typically used as embankment fill, and will not normally be included in calculations. However; if the required auxiliary spillway excavation is greater than the earth fill quantity, excavation could be the controlling pay item. Contact the resource engineer prior to staking a job such as this for construction.
4. Volume of material required to be excavated to construct a designed reservoir. The 12-point method will be used to determine design depth of cut "D". When a structure involves a designed excavated pit and a designed embankment the excavated pit volume will be the extent. Exception – fill will be the extent when the volume of fill for the designed embankment is greater than the excavated pit volume.